(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 342 704 B1**

(12) # EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **04.08.93** (51) Int. Cl.5: **G03G 15/00**, G03G 15/01

(21) Application number: **89109090.4**

(22) Date of filing: **19.05.89**

(54) **Image forming apparatus.**

(30) Priority: **20.05.88 JP 123682/88**

(43) Date of publication of application:
23.11.89 Bulletin 89/47

(45) Publication of the grant of the patent:
04.08.93 Bulletin 93/31

(84) Designated Contracting States:
DE FR GB IT

(56) References cited:
EP-A- 0 266 946
EP-A- 0 303 276
DE-A- 3 336 820
US-A- 4 172 655

PATENT ABSTRACTS OF JAPAN, vol. 12, no. 185 (P-710), 19 December 1987 ; & JP-A-62293258 (CANON), 31.05.1988

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an image forming apparatus such as a copying machine.

Related Background Art

For the reason that various kinds of originals or manuscripts to be copied are widely used and various kinds of images are requested by operators, not only a popular monochromatic copy which is normally and widely used, but also colored copies (that is, an image is formed with colors such as red, blue and the like by means of an image forming apparatus) have recently been requested.

In order to meet such request, as shown in Fig. 2, an image forming apparatus wherein a plurality of developer containers each including developer of different color such as red, blue, green and the like are prepared and these developer containers can be automatically changed at an operator's need, thus permitting the formation of multi-colored image has been proposed.

In Fig. 2, an original 2 positioned on an original support glass 1 is illuminated by a lamp 3 to create a light image. The light image is directed to a photosensitive drum 11 through an optical system comprising reflection mirrors 4, 5, 6, 7, 8, and 9, and a zoom lens 10. The lamp 3, mirror 4 and mirror 5, 6 are shifted at a predetermined speed in a direction shown by an arrow to scan the original 2. On the other hand, since the photosensitive drum 11 is rotated in a direction shown by an arrow, after charges are uniformly applied to an outer surface of the drum by a primary charger 12, electrostatic latent images corresponding to the original images are sequentially formed on the surface of the drum 11.

In association with the photosensitive drum 11, color developer containers 13B, 13C, 13D each containing colored toner (such as red toner, blue toner, green toner) and a black developer container 13A containing black toner are arranged. These developer containers 13A, 13B, 13C and 13D can be shifted in an up-and-down direction and in a direction shown by an arrow. The developer container corresponding to a desired color image is shifted to a desired level and then is shifted toward the photosensitive drum 11 to a developing station, where the electrostatic latent image is visualized by the colored toner contained in such developer container. The visualized or developed image is transferred onto a sheet, i.e., transfer paper 17 by a transfer charger 15. Thereafter, the photosensitive drum 11 is rotated to a cleaning station, where the residual toner remaining on the drum surface is removed by a cleaner 16 to prepare for a next copying cycle.

The transfer paper or sheet 17 can be fed into the copying machine by any one of the following methods.

In a first method, the transfer papers 17 stacked in a sheet cassette 18 are fed one by one toward a pair of rollers 20 by means of a pick-up roller 19. If a plurality of transfer papers 17 are fed in an overlapped condition to the paired rollers 20, these rollers can separate an uppermost transfer paper from the others to fed only one transfer paper into the machine. After passing through the paired rollers 20, the transfer paper 17 is fed to resist rollers 23 through guide plates 21, 22, a pair of feed rollers 50 and guide plates 52, 53, 51.

In a second method, the transfer papers 17 stacked in a sheet cassette 24 are fed one by one toward a pair of rollers 26 by means of a pick-up roller 25. The paired rollers 26 have the same function as that of the aforementioned paired rollers 20. After passing through the paired rollers 26, the transfer paper 17 is fed to the resist rollers 23 through guide plates 27, 28, paired feed rollers 50 and guide plates 52, 53, 51. The resist rollers 23 are rotated in synchronous with the rotation of the photosensitive drum 11 so that the transfer paper 17 fed to the photosensitive drum 11 from the resist rollers 23 thorugh an upper guide 31 and a lower guide 32 mates with the visualized image on the drum.

As mentioned above, the image on the photosensitive drum 11 is transferred onto the transfer paper 17 by the transfer charger 15. Thereafter, the transfer paper is separated from the drum surface by means of a separating charger 33. Then, the transfer paper is fed, through a feeding means 34, to a fixing device 35 including a heating roller 35a and a pressure roller 35b. The image transferred on the transfer paper is heated and pressurized in the fixing device 35 to be fixed on the transfer sheet as a permanent image. Then, the transfer paper 17 is fed to a first ejector or discharge roller 36, from where the transfer sheet is fed to a second ejector roller 39 through flappers 37 and 38. The transfer paper is ejected from the copying machine by this second ejector roller. Incidentally, in Fig. 2, although the flapper 38 is shown to block a transfer paper feeding path, the flapper 38 is made of light-weighted material and is freely rotatable in a direction shown by an arrow (i.e., in a clockwise direction). Accordingly, when the transfer paper 17 encounters the flapper 38, the latter is pushed up by a leading edge of the transfer paper, and thus is rotated in a clockwise direction to a

retracted position to permit the passing of the transfer paper.

Further, the above-mentioned copying machine has a both-side copying function and a multiple copying function. Next, fundamental feeding operations regarding the transfer paper in these functions will be explained.

When the both-side (both-surface) copying function is selected in the copying machine, the transfer paper 17 is moved up to the second ejector roller 39 in the same fundamental manner as that mentioned above, meanwhile the image is transferred onto one surface of the transfer sheet and is fixed thereto as mentioned above. While the transfer sheet is being ejected from the copying machine, when a predetermined time interval is elapsed after a trailing edge of the transfer sheet is detected by a sheet detecting mechanism comprising a detection lever 40 and a photosensor 41 (i.e., when the trailing edge of the transfer paper has passed the flapper 38), the second ejector roller 39 is rotated in a reverse direction, thus introducing the transfer paper into the copying machine again.

The transfer paper 17 then advances toward the inside of the copying machine with directing the trailing edge thereof to a forward direction, and is guided by left inclined surfaces of the flappers 38, 37, guide paltes 42, 43, 44, 44' and rollers 100 to reach rollers 45. Thereafter, the transfer paper 17 reaches to re-feed rollers 47 through rollers 46. In this point, the re-feed rollers 47 are stopped. After the transfer paper completely abuts against the rollers 47, the paired rollers 45, 46 are also stopped, thus waiting for a new copying operation regarding the other surface of the transfer paper. When a copy start signal regarding the other surface of the transfer paper is emitted or discharged, the re-feed rollers 47 start to rotate, whereby the transfer paper is fed to the resist rollers 23 through guide plates 48 and 49. Then, a new image is transferred onto the other surface of the transfer sheet and is fixed thereto in the same fundamental manner as mentioned above. The transfer paper on both surfaces of which the images are copied is finally ejected from the copying machine by means of the second ejector roller 39.

On the other hand, when the multiple copying function is selected in the copying machine, in a first copying cycle, an image is transferrred onto the transfer sheet and is fixed thereto in the same fundamental manner as mentioned above. In the multiple copying function, the flapper 37 is positioned in a position shown by a broken line in Fig. 2. Accordingly, the transfer paper 17 fed by the first ejector roller 36 with directing the leading edge thereof to a forward direction is fed to the guide plates 42, 43 along a right inclined surface of the flapper 37, and then is fed to the paired rollers 45 through the guide plates 44, 44' and the paired rollers 100. Thereafter, the transfer paper 17 reaches the pair of re-feed rollers 47 through the paired rollers 46. When the a predetermined time period is elapsed after the trailing edge of the transfer paper 17 is detected by the detection lever 40 and the photosensor 41, the flapper 37 is returned to a position shown by a solid line in Fig. 2. And, when a second copying signal is emitted, the re-feed rollers 47 start to rotate, whereby the transfer paper is fed to the photosensitive drum 11 in the same manner as that in the case of the both-side copying function, where a new image is transferred onto the same surface of the transfer paper as the surface on which the image is transferred in the first copying cycle. Thereafter, the transfer paper on the surface of which multiple images are copied is finally ejected from the copying machine by means of the second ejector roller 39.

When the multi-colored image is formed on the transfer paper by using such copying machine, fundamentally, the copying cycles are repeated per the used color toners (developer containers including such color toners). For example, in order to obtain a copied image including three colors of green, red and blue, firstly, an image is formed on the transfer paper 17 with green color toner by using the developer container 13C, then the same transfer paper 17 is fed to the image forming portion (photosensitive drum) again through a transfer paper feeding path shown by a letter A (Fig. 2). Then, the developer container 13C is changed to the developer container 13B, and a new image is formed on the same transfer paper with red color toner. And, similarly, a new image is formed on the same transfer paper with blue color toner (included in the developer container 13D) to complete the three colored image.

While an example that the three colored image is formed on a single transfer paper was explained above, when the same three colored images are to be formed on n (in number) transfer papers, it is necessary to repeat the above-mentioned copying cycles by n times in the aforementioned conventional copying machine. Consequently, in the conventional copying machine, the developer containers must be changed by three times each time when the colored image is formed on the single transfer paper, thus increasing the total copying time.

Conventionally, copying machines which can obtain a plurality of both side and/or multiple copies by providing an intermediate tray for the both-side copying and multiple copying functions have been proposed. However, each of these conventional copying machines is only effective to form two images, in the both-side copying function and multiple (only two) copying function, i.e., to

form only two images in total, but cannot be obtain a plurality of copies with the single intermediate tray in the case where an image is formed in three or more copying cycles, for the reason that both a transfer paper used for a next image forming operation and a transfer paper on which the image is already formed and which is used for a next copying cycle cannot be contained in the same intermediate tray.

In order to solve this problem, a copying machine having a plurality of intermediate trays has been proposed (for example, as disclosed in the Japanese patent Application Laid-Open No. 62-293258). In this conventional copying machine, two (first and second) intermediate trays are provided, and the above-mentioned transfer paper on which the image is already formed and which is used for a next copying cycle is received in the second intermediate tray, thus preventing the mixing of two kinds of transfer papers, whereby n (in number) colored image can be formed on a single transfer paper or an image can be formed on a single transfer paper in n (in number) copying cycles, for a plurality of transfer papers, thereby reducing the total copying time.

However, in this conventional copying machine, since two intermediate trays are used, the whole copying machine will be large-sized and expensive, thus limiting the usage thereof and making wide use thereof difficult.

In such a conventional copying machine, when a plurality of copies are obtained by performing three or more copying cycles for each transfer sheet, the intermediate trays cannot be used and the copying cycles must be repeated for each copy or transfer paper, thus increasing the total copying time. In addition, in the case where different originals are to be used, the originals must be changed per each image forming operation, resulting in making troublesome and increasing the copying time. Further, since the original is repeatedly used, the damage of the originals are not negligible.

In order to eliminate the above-mentioned drawbacks, a copying machine having three or more intermediate trays has been proposed. However, in this case, of course, the whole machine would be larger-sized and expensive, thus preventing the wide use thereof.

SUMMARY OF THE INVENTION

The present invention is directed to eliminate the above-mentioned conventional drawbacks.

It is an object of the present invention to provide an image forming apparatus which can perform a plurality of image forming operations on the same sheet, without having a large space for accommodating intermediate trays.

It is a further object of the present invention to provide an image forming apparatus which can perform three or more image forming operations on each of a plurality of sheets at a high speed.

In order to achieve the above object, an image forming apparatus according to the present invention comprises an image forming means for forming an image on a sheet, a stacking means for stacking sheets on each of which the image is formed by the image forming means, one after another, with shifting one another by a predetermined amount in a sheet feeding direction, a feeding means for feeding the sheet from the sheet stack formed by the stacking means, one by one, to the image forming means, a conveying means for the sheet stack formed by the stacking means between the stacking means the feeding means, and a control means for controlling the conveying means in such a manner that the sheet stack is conveyed from the feeding means to the stacking means so as to form a sheet stack from the sheets which are fed from the sheet stack by the feeding means and on each of which the image is formed.

Furthermore; the present invention is directed to a sheet feeding apparatus which can be used in an image forming apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a sectional view of an image forming apparatus according to the present invention;
Fig. 2 is a sectional view of a conventional image forming apparatus;
Fig. 3 is a block diagram of a sheet feeding portion of the image forming apparatus according to the present invention;
Fig. 4 is a plan view of a operation panel of a keyboard;
Figs. 5 and 6 are flow charts for stacking sheet;
Figs. 7 and 8 are explanatory views for explaining a sheet stacking operation;
Fig. 9 is a flow chart for re-feeding the sheet;
Fig. 10 is a flow chart for stacking the re-feed sheets;
Figs. 11 and 12 are explanatory views for explaining a sheet processing operation; and
Figs. 13 to 15 are explanatory views for explaining sheet processing operations in image forming apparatus according to other embodiments of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 shows, in section, an image forming apparatus which has a both-side copying function and a multiple copying function with different col-

ors, according to a preferred embodiment of the present invention.

In Fig. 1, constructural elements similar to those shown in Fig. 2 are designated by the same reference numerals and the explanation thereof will be omitted. It should be noted that, in this image forming apparatus, the both-side copying function and the multiple copying function regarding a single sheet are performed in the same manner as those in the above-mentioned conventional case (Fig. 2).

Fig. 3 shows a block diagram for controlling rollers and sensors arranged in a sheet re-feeding path 99 from rollers 100 to re-feed rollers 47 of Fig. 1.

In Fig. 3, paired rollers 45, 46 and the re-feed rollers 47 are driven by motors 45M, 46M and 47M, respectively, which motors are connected to the corresponding rollers through respective transmission means such as gears (not shown). The motors 45M, 46M and 47M each comprises a reversible stepping motor which can be rotated by a predetermined angle in response to the number of pulses fed from a control circuit 60. A keyboard 61 is used for selecting the number of copies, both-side copying mode, multiple copying mode and the like and for commanding the copy start with respect to the control circuit 60.

Fig. 4 shows a portion of the keyboard. As shown in Fig. 4, the keyboard includes a both-side copying mode designating key 101, a multiple copying mode designating key 102, and keys 103 for designating the number of copying cycles to be effected in the multiple copying mode (i.e., for designating how many times are the images overlapped or superimposed). In the illustrated embodiment, 2-7 copying cycles can be designated. However, of course, it should be noted that the designation of the number of the copying cycles is not limited to the above, but the number of the copying cycles may be freely designated by using the ten-key of the keyboard.

The keyboard further includes keys 104 for setting the number of sheets to be copied (i.e., for designating the number of sheets on each of which the same image is formed), a display panel 105 for displaying the designated number of sheets, a clear key 106 for resetting the number displayed on the display panel to "1", and a copy start key 107.

In Fig. 3, the reference numerals 62, 63, 64 and 65 denote guide for guiding the sheet. The guide 64 has a cavity 64A for receiving a loop formed in the sheet when the sheet abuts against the re-feed rollers 47. The reference numerals 66 and 67 denote sensors for detecting the presence of the sheet.

Next, an operation up to the image forming will be explained with reference to the flow chart shown in Fig. 5.

In a step S1, the number of images to be superimposed is set or designated by using the keys 103 for designating the number of copying cycles, and, in a step S2, the number of sheets to be copied is set by using the copy number setting keys 104. In a next step S3, it is discriminated whether the copy start key 107 is turned ON or not, and if the key 107 was turned ON, the copying operation is started in a step S4.

Next, an operation for containing or receiving a plurality of sheets in the sheet re-feeding path 99 will be explained with reference to the flow chart shown in Fig. 6.

After the both-side copying mode or the multiple copying mode is designated and the copy start is instructed by using the keyboard 61 (in the above step S3), the sheet which has been picked up from the sheet cassette 18 or 24 and on one surface of which the image has been formed by the photosensitive drum 11 as mentioned above is fed to the rollers 100 as mentioned above. When a predetermined time period t_1 necessary for sending or feeding a leading edge of the sheet to the nip between the paired rollers 45 after the leading edge of the sheet is detected by the sensor 67 (in a step S11 of Fig. 6) is elapsed (in a step S12), the motor 45M is started to rotate (in a step S13). The motor 45M is rotated for a time period t_2 necessary for feeding the sheet from the nip between the paired rollers 45 by a predetermined distance ℓ (in a step S14), and thereafter, the motor 45M is stopped (in a step S15).

Incidentally, the rotation of the paired rollers 45 can also be controlled by the number of pulses fed from the control circuit to the motor 45M in such a manner that the control circuit feeds, to the motor, the number of pulses corresponding to a rotation angle of the motor necessary for feeding the sheet from the nip between the paired rollers 45 by the predetermined distance ℓ.

Next, in a step S16, it is discriminated whether the designated number of sheets have been stacked or not, and if NO, the sequence is returned to the step S11. Then, a next sheet is fed. After the next sheet is reached the paired rollers 45, the next sheet is fed by the predetermined distance ℓ in the same manner as mentioned above (see Fig. 7), by means of the paired rollers 45. In this way, the two sheets are stacked with shifting by the distance ℓ one another. By repeating such operations by times corresponding to the designated number of the sheets, the sheets can be stacked one after with shifting by the distance ℓ one another, as shown in Fig. 8.

Next, an operation for re-feeding the stacked sheets for use in the both-side copying mode (image formation on the back surface of the sheet) or in the multiple (twice) copying mode (second copying cycle) will be explained with reference to the flow charts shown in Figs. 9 and 10.

In the step S16 of Fig. 16, when it is discrimianted that the designated number of sheets has been stacked, the sequence goes to a step S31 of Fig. 10, where the operation is in a waiting condition for replacement of the originals and/or developer containers until the copy start key 107 is turned ON. When the copy start key 107 is turned ON, in a step S32, it is discriminated whether the last but one image forming operation has been completed or not. Since the step S32 shows affirmative in the both-side copying mode or the twice copying mode, the sequence goes to the flow chart of Fig. 9.

In a step S21 of Fig. 9, the motors 45M and 46M are started to rotate, thus feeding the stacked sheets to the re-feed rollers 47. When the trailing edge of the foremost sheet has just passed through the paired rollers 46, the motors 45M and 46M are stopped (in a step S24). This timing is determined (in a step S23) by the time elapsed after the leading edge of the foremost sheet is detected by the sensor 66 (in a step S22). Next, in a step S26, the motor 47M is driven to rotate the lower roller in the paired rollers 47, thus feeding the lowermost (i.e., foremost) sheet. In this case, since the remaining sheets are maintained stationary with being pinched by the stopped roller pairs 45 or 46, the foremost sheet can be separated from the remaining sheets.

Accordingly, by holding the remaining sheets by stopping the paired rollers 45 and 46, only the lowermost sheet can be fed. By repeating such operation by times corresponding to the designated number of the sheets, the sheet can be fed one by one from the sheet stack.

In performing two image forming operations regarding a single sheet in the both-side copying mode or the multiple copying mode, after the second image forming operation is completed, the sheet is ejected from the image forming apparatus through the medium of the first and second ejector rollers 36, 39, thus completing a series of copying operations.

Next, a sequence for performing three or more image forming operations regarding a plurality of sheets, for example, to obtain a copied image superimposed with three or four colors will be explained with reference to the flow chart shown in Fig. 10.

The sequence advances in accordance with the flow charts of Figs. 5 and 6 until the plurality of sheets are stacked as shown in Fig. 8 after the first image forming operation is completed.

Next, when the copy start is commanded by using the keyboard 61 (in a step S31), in a step S32, it is discriminated or judged whether the last but one image forming operation has been completed or not. If the last but one image forming operation has been completed and when the next operation is the last image forming operation, the sheets are fed in accordance with the flow chart of Fig. 9, and the sheets on which the complete image has been copied are ejected from the image forming apparatus by means of the second ejector roller 39. Incidentally, the fact whether the next operation is the last image forming operation or not can be judged by comparing the number of the image forming operations (to be repeated) inputted in the control circuit 60 from the keyboard 61 with the repeated number of completed image forming operations counted by the control circuit 60.

When it is judged that the next operation is not the last or final image forming operation, i.e., when the sheets are to be fed to the sheet re-feeding path 99 for repeating the image forming operation, the sequence goes to a step S33, where the whole stacked sheets are fed by the paired rollers 45 and 46. When a predetermined time period t_3 is elapsed after the leading edge of the foremost sheet is detected by the sensor 66 (in a step S34), i.e., when the leading edge of the foremost sheet abuts against the nip between the re-feed rollers 47 and the trailing edge thereof has just passed through the paired rollers 46, the paired rollers 45 and 46 are stopped (in a step S36), and the re-feed rollers 47 are rotated in a normal direction, thus feeding only the foremost or lowermost sheet (in a step S37).

Next, in a step S38, the paired rollers 45 and 46 are rotated in a reverse direction, thus returning the whole remaining stacked sheets in an upstream direction (shown by an arrow in Fig. 12). Then, when the leading edge of an uppermost sheet is shifted by the predetermined distance ℓ from the paired rollers 45 in a downstream direction as shown in Fig. 12 (in a step S39), the paired rollers 45 and 46 are stopped (in a step S310), thus waiting until the fed sheet is copied and is returned to the sheet re-feeding path. When the leading edge of the fed sheet passes through the sensor 67 (in a step S311) and reaches to the nip between the paired rollers 45 (in a step S312), the paired rollers 45 and 46 are rotated by the predetermined amount (in steps S313, S314 and S315), thus overlapping the returned sheet on the uppermost sheet with shifting the leading edge of the returned sheet by the distance ℓ in the upstream direction with respect to the uppermost sheet. When such operations are repeated by times corresponding the number of firstly stacked sheets (in a step S316),

the second image forming operation regarding all of the sheets is finished, and all of the sheets are again in the stacked condition with shifting by the predetermined distance ℓ one another, as shown in Fig. 8. Then, the sequence returns to the step S312. And, as mentioned above, the third image forming operation can be started by feeding the lowermost sheet in the sheet stack to the photosensitive drum.

Further, here, if the transfer sheets on which the image is formed by the third image forming operation are directed to the paired rollers 45 in the same manner as mentioned above, the fourth image forming operation can be performed. In this way, n (in number) image forming operations on the single sheet can be performed with respect to a plurality of sheets successively.

In the illustrated embodiment, it is necessary to shift the sheet stack so that the leading edge of the uppermost sheet is positioned forwardly of the paired rollers 45 with spacing the predetermined distance ℓ therefrom and the trailing edge of the lowermost sheet is positioned just behind the paired rollers 46. To this end, as mentioned above, the paired rollers 45 and 46 are driven by the respective stepping motors each of which is reversible and can be controlled to rotate by a desired rotation angle corresponding to a desired feeding distance for the sheets. By counting the number of pulses fed to the stepping motors for feeding the sheets in the normal or reverse direction between the step S34 of Fig. 10 to the step S39, the present position of the sheets can be determined.

In the illustrated embodiment, the sheets on which the image is formed in the second image forming operation are stacked successively on the stacked sheets on which the image is formed in the first image forming operation, with shifting by the predetermined distance one another. Accordingly, the first sheet on which the image is formed in the second image forming operation is overlapped on the uppermost sheet (the last sheet) of the stacked sheets on each of which the first image is formed and which wait for the second image forming operation, with shifting by the distance ℓ one another.

Therefore, in order to feed all of the sheets on which the first image is formed to the sheet refeeding path for use in the second image forming operation, the number of the firstly stacked sheets is previously stored or memorized, and the feeding operations are repeated by times corresponding to the memorized number. In this case, if double feed of the sheets occurs in the sheet feeding operation due to any trouble, there will arise a difference between the memorized number and the number of sheets actually fed. That is to say, there is a danger that the sheet on which the second image has already been formed is erroneously detected as the last sheet for the second image forming operation and such sheet is fed for the second image forming operation.

To avoid this, in an embodiment which will be described below, the sheet stack incldiuing the sheets on which the image is formed is overlapped on the sheet stack being fed, with shifting by a distance larger than the predetermined distance ℓ - (between the sheets) one another, thus separating two kinds of sheet stacks from each other. In this method, before the first sheet on which the image is formed is overlapped on the sheet stack to be fed from now, the leading edge of the uppermost sheet of such sheet stack is previously positioned downstream of the paired rollers 45 with spacing therefrom by a distance ℓ' larger than the distance ℓ (Figs. 13, 14). Accordingly, the first sheet will be overlapped on the sheet stack with shifting by the distance ℓ' with respect to the uppermost sheet of the sheet stack. Next, the second sheet is overlapped on the first sheet with shifting by the distance ℓ one another, and third, fourth, ... final sheets are similarly overlapped on the previous sheet with shifting by the distance ℓ one another.

With this arrangement, even if the double feed of the sheets occurs in the sheet feeding operation to cause the difference between the memorized number and the number of sheets actually fed, since the second sheet stack including the sheets on which the second image is formed is spaced apart from the first sheet stack to be fed for the second image forming operation by the distance ℓ', the second sheet stack does not come into the feeding condition (i.e., the lowermost sheet of the second sheet stack does not reach the paired rollers 46) immediately after the first sheet stack is emptied. Accordingly, in this condition, if the refeed rollers 47 are driven, the second sheet stack is not fed because it is held stationary by the stopped rollers 46. In this way, the erroneous feeding of the sheet can be prevented. Further, if it is so designed that the boundary between the first and second sheet stacks can be detected by the sensor 66, the erroneous feeding of the sheet will be further positively prevented.

More particularly, as shown in Fig. 15, by arranging the sensor 66 to position between the distance ℓ' between the first and second sheet stacks, the condition that the first sheet stack is emptied can be detected.

In the illustrated embodiment, while the boundary between the sheet stacks was detected by the sensor 66 provided for detecting the leading edge of the sheet, the number of the sensors and/or the position thereof are not limited to the illustrated embodiments.

Further, in the illustrated embodiments, while two pairs of rollers 45, 46 were used for forming

and shifting the sheet stack, the number of pairs of rollers is not limited to two. For example, only one pair of rollers may be used in the smaller image forming apparatus, and three or more pairs of rollers may be used in the larger image forming apparatus.

Lastly, in the illustrated embodiments, while the present invention was applied to the copying machine, it should be noted that the present invention is not limited to the copying machine, but can be applied to the whole image forming apparatuses which can output the image on the sheet, such as a printer, facsimile, plotter and the like.

Claims

1. A sheet feeding apparatus comprising:
   sheet stacking means for stacking sheets successively with shifting by a predetermined amount in a sheet feeding direction one from the other;
   feeding means for feeding the sheets one by one from a sheet stack obtained by stacking the sheets with shifting by the predetermined amount one from the other;
   conveying means for conveying said sheet stack formed by said sheet stacking means in normal and reverse directions between said sheet stacking means and said feeding means; and
   control means for controlling said conveying means in such a manner that said conveying means conveys said sheet stack to said sheet stacking means when the sheets are stacked and conveys said sheet stack to said feeding means when the sheets are fed.

2. A sheet feeding apparatus according to Claim 1, wherein said sheet stacking means includes a tray on which the sheets are stacked.

3. A sheet feeding apparatus according to Claim 1, wherein said sheet stacking means has conveying rotary members for feeding the sheet together with the previously fed sheets each time when the sheet is fed thereto.

4. A sheet feeding apparatus according to Claim 1, wherein said feeding means feeds the sheet while pinching said sheet therebetween.

5. A sheet feeding apparatus according to Claim 4, wherein said feeding means includes a pair of feeding rotary members for pinching the sheet therebetween.

6. A sheet feeding apparatus according to Claim 1, wehrein said conveying means conveys the sheet while pinching said sheet therebetween.

7. A sheet feeding apparatus according to Claim 6, wherein said feeding means includes a pair of second feeding rotary members for pinching the sheet therebetween.

8. A sheet feeding apparatus according to Claim 6, wherein said control means controls said conveying means in such a manner that, when the sheet is fed, said conveying means conveys said sheet stack to said feeding means until a sheet in said stack nearest to said feeding means is released from a pinched condition by means of said conveying means.

9. A sheet feeding apparatus according to Claim 8, wherein, when the sheet is fed, said conveying means pinches the sheets other than a sheet to be fed by said feeding means.

10. An image forming apparatus comprising:
    image forming means for forming an image on a sheet;
    sheet stacking means for successively stacking sheets on which the image is formed by said image forming means, with shifting by a predetermined amount in a sheet feeding direction one from the other;
    feeding means for feeding the sheets one by one from a sheet stack obtained by stacking the sheets with shifting by the predetermined amount one from the other;
    conveying means for conveying said sheet stack formed by said sheet stacking means in normal and reverse directions between said sheet stacking means and said feeding means; and
    control means for controlling said conveying means in such a manner that said conveying means returns said sheet stack from said feeding means to said sheet stacking means to stack the sheets on which the image is formed by said image forming means after they have been fed by said feeding means, for obtaining a new sheet stack.

11. An image forming apparatus according to Claim 10, wherein said sheet stacking means has conveying rotary members for feeding the sheet together with the previously fed sheets each time when the sheet is fed thereto.

12. An image forming apparatus according to Claim 10, wherein said feeding means feeds the sheet while pinching said sheet therebetween.

13. An image forming apparatus according to Claim 12, wherein said feeding means includes a pair of feeding rotary members for pinching the sheet therebetween.

14. An image forming apparatus according to Claim 10, wherein said conveying means conveys the sheet while pinching said sheet therebetween.

15. An image forming apparatus according to Claim 14, wherein said control means controls said conveying means in such a manner that said conveying means conveys said sheet stack to said feeding means until a sheet in said stack nearest to said feeding means is released from a pinched condition by means of said conveying means, to feed the sheets by means of said feeding means.

16. An image forming apparatus according to Claim 15, wherein, when the sheet is fed, said conveying means pinches the sheets other than a sheet to be fed by said feeding means.

17. An image forming apparatus according to Claim 15, wherein said conveying means and said sheet stacking means hold conveying rotary members rotatable while pinching the sheet therebetween in common.

18. A sheet feeding apparatus comprising:

first conveying means for conveying a sheet in a predetermined direction;

tray for stacking the sheets being fed by said first conveying means;

moving means for moving the sheets stacked on said tray, to overlap the sheet fed by said first conveying means on a sheet previously stacked on said tray with shifting by a predetermined distance in said predetermined direction with respect to said previously stacked sheet;

feeding means for feeding the sheets one by one from a sheet stack obtained by stacking the sheets with shifting by the predetermined distance one from the other; and

second conveying means for conveying said sheet stack obtained by stacking the sheets with shifting by the predetermined distance one from the other, to said feeding means, and for conveying said sheet stack from said feeding means to said tray.

19. A sheet feeding apparatus according to Claim 18, wherein said moving means moves a sheet together with sheets previously stacked and moved by the predetermined distance, each time when the sheet is stacked on said tray.

20. A sheet feeding apparatus according to Claim 18, wherein said moving means moves the sheet in said predetermined direction by a first predetermined distance until a trailing edge of said sheet passes through said first conveying means, and thereafter, returns said sheet in a reverse direction by a second predetermined distance shorter than said first predetermined distance.

21. A sheet feeding apparatus according to Claim 18, wherein said second conveying means conveys said sheet stack in a position where the sheet conveyed by said first conveying means can be overlapped on a sheet of said sheet stack nearest to said first conveying means with shifting by the predetermined distance one another.

Patentansprüche

1. Blatt-Zuführvorrichtung, die umfaßt:
   - Blatt-Stapeleinrichtungen zur Stapelung von Blättern nacheinander unter Verschiebung mit einem vorbestimmten Wert eines vom anderen in einer Blatt-Förderrichtung;
   - Fördereinrichtungen zum Fördern der Blätter eines nach dem anderen von einem Blattstapel, der durch Stapeln der Blätter unter Verschiebung mit einem vorbestimmten Wert eines zum anderen erhalten wurde;
   - Transporteinrichtungen zum Transport des genannten, durch die erwähnten Blatt-Stapeleinrichtungen gebildeten Blattstapels in normaler und umgekehrter Richtung zwischen den erwähnten Blatt-Stapeleinrichtungen sowie den besagten Fördereinrichtungen; und
   - Steuereinrichtungen zur Steuerung der genannten Transporteinrichtungen in einer solchen Weise, daß die genannten Transporteinrichtungen den besagten Blattstapel zu den erwähnten Blatt-Stapeleinrichtungen transportieren, wenn die Blätter gestapelt werden, und den besagten Blattstapel zu den erwähnten Fördereinrichtungen transportieren, wenn die Blätter gefördert werden.

2. Blatt-Zuführvorrichtung nach Anspruch 1, in welcher die erwähnten Blatt-Stapeleinrichtungen eine Schale enthalten, auf welcher die Blätter gestapelt werden.

3. Blatt-Zuführvorrichtung nach Anspruch 1, in welcher die erwähnten Blatt-Stapeleinrichtungen transportierende Drehelemente besitzen, um das Blatt zusammen mit den vorher geförderten Blättern jedesmal zu fördern, wenn das Blatt dorthin gefördert wird.

4. Blatt-Zuführvorrichtung nach Anspruch 1, in welcher die besagten Fördereinrichtungen das Blatt fördern, während dieses Blatt zwischen ihnen eingeklemmt wird.

5. Blatt-Zuführvorrichtung nach Anspruch 4, in welcher die besagten Fördereinrichtungen ein Paar von fördernden Drehelementen enthalten, um das Blatt zwischen diesen einzuklemmen.

6. Blatt-Zuführvorrichtung nach Anspruch 1, in welcher die genannten Transporteinrichtungen das Blatt transportierren, während dieses Blatt zwischen ihnen eingeklemmt wird.

7. Blatt-Zuführvorrichtung nach Anspruch 6, in welcher die besagten Fördereinrichtungen ein Paar von zweiten fördernden Drehelementen- enthalten, um das Blatt zwischen diesen einzuklemmen.

8. Blatt-Zuführvorrichtung nach Anspruch 6, in welcher die erwähnten Steuereinrichtungen die genannten Transporteinrichtungen in einer solchen Weise steuern, daß, wenn das Blatt gefördert wird, die genannten Transporteinrichtungen den besagten Blattstapel zu den erwähnten Fördereinrichtungen transportieren, bis ein Blatt in dem besagten Stapel, das den erwähnten Fördereinrichtungen am nächsten ist, aus einem geklemmten Zustand durch die genannten Transporteinrichtungen freigegeben wird.

9. Blatt-Zuführvorrichtung nach Anspruch 8, in welcher die genannten Transporteinrichtungen, wenn das Blatt gefördert wird, die Blätter außer einem, das durch die besagten Fördereinrichtungen zu fördern ist, einklemmen.

10. Bilderzeugungsgerät, das umfaßt:
- Bilderzeugungseinrichtungen, um eine Abbildung an einem Blatt auszubilden;
- Blatt-Stapeleinrichtungen, um aufeinanderfolgend Blätter, an welchen die Abbildung durch die genannten Bilderzeugungseinrichtungen ausgebildet wird, unter Verschiebung mit einem vorbestimmten Wert eines vom anderen in einer Blatt-Förderrichtung zu stapeln;
- Fördereinrichtungen zum Fördern der Blätter eines nach dem anderen von einem Blattstapel, der durch Stapeln der Blätter unter Verschiebung mit einem vorbestimmten Wert eines zum anderen erhalten wurde;
- Transporteinrichtungen zum Transport des genannten, durch die erwähnten Blatt-Stapeleinrichtungen gebildeten Blattstapels in normaler und umgekehrter Richtung zwischen den erwähnten Blatt-Stapeleinrichtungen sowie den besagten Fördereinrichtungen; und
- Steuereinrichtungen zur Steuerung der genannten Transporteinrichtungen in einer solchen Weise, daß die genannten Transporteinrichtungen den erwähnten Blattstapel von den besagten Fördereinrichtungen zu den genannten Blatt-Stapeleinrichtungen zurückführen, um die Blätter, auf denen die Abbildung durch die besagten Bilderzeugungseinrichtungen ausgebildet wird, nachdem sie durch die besagten Fördereinrichtungen gefördert worden sind, zu stapeln, um einen neuen Blattstapel zu erhalten.

11. Bilderzeugungsgerät nach Anspruch 10, in welchem die erwähnten Blatt-Stapeleinrichtungen transportierende Drehelemente besitzen, um das Blatt zusammen mit den vorher geförderten Blättern jedesmal zu fördern, wenn das Blatt dorthin gefördert wird.

12. Bilderzeugungsgerät nach Anspruch 10, in welchem die besagten Fördereinrichtungen das Blatt fördern, während dieses Blatt zwischen ihnen eingeklemmt wird.

13. Bilderzeugungsgerät nach Anspruch 12, in welchem die besagten Fördereinrichtungen ein Paar von fördernden Drehelementen enthalten, um das Blatt zwischen diesen einzuklemmen.

14. Bilderzeugungsgerät nach Anspruch 10, in welchem die genannten Transporteinrichtungen das Blatt transportieren, während dieses Blatt zwischen ihnen eingeklemmt wird.

15. Bilderzeugungsgerät nach Anspruch 14, in welchem die Steuereinrichtungen die genannten Transporteinrichtungen in einer solchen Weise steuern, daß diese Transporteinrichtungen den besagten Blattstapel zu den erwähnten Fördereinrichtungen transportieren, bis ein Blatt in dem besagten Stapel, das den erwähnten Fördereinrichtungen am nächsten ist, aus einem geklemmten Zustand durch die genannten

Transporteinrichtungen freigegeben wird, um die Blätter mittels der erwähnten Fördereinrichtungen zu fördern.

16. Bilderzeugungsgerät nach Anspruch 15, in welchem die genannten Transporteinrichtungen, wenn das Blatt gefördert wird, die Blätter außer einem, das durch die besagten Fördereinrichtungen zu fördern ist, einklemmen.

17. Bilderzeugungsgerät nach Anspruch 15, in welchem die genannten Transporteinrichtungen und die erwähnten Blatt-Stapeleinrichtungen transportierende Drehelemente besitzen, die drehbar sind, während sie gemeinsam das Blatt zwischen sich einklemmen.

18. Blatt-Zuführvorrichtung, die umfaßt:
- erste Transporteinrichtungen, um ein Blatt in einer vorbestimmten Richtung zu transportieren;
- eine Schale, um die Blätter, die in der besagten ersten Transporteinrichtung transportiert werden, zu stapeln;
- Bewegungseinrichtungen, um die auf der genannten Schale gestapelten Blätter zu verschieben, um das von der besagten ersten Transporteinrichtung transportierte Blatt einem vorher auf der genannten Schale gestapelten Blatt unter einer Verschiebung mit einer vorbestimmten Strecke in der erwähnten vorbestimmten Richtung mit Bezug zu dem besagten vorher gestapelten Blatt zu überlagern;
- Fördereinrichtungen zum Fördern der Blätter eines nach dem anderen von einem Blattstapel, der durch Stapeln der Blätter unter Verschiebung mit der vorbestimmten Strecke eines vom anderen erhalten wurde; und
- zweite Transporteinrichtungen, um den genannten, durch Stapeln der Blätter unter Verschiebung um die vorbestimmte Strecke eines zum anderen erhaltenen Blattstapel zu den erwähnten Fördereinrichtungen zu transportieren und um den genannten Blattstapel von den erwähnten Fördereinrichtungen zu der besagten Schale zu transportieren.

19. Blatt-Zuführvorrichtung nach Anspruch 18, in welcher die besagten Bewegungseinrichtungen ein Blatt zusammen mit vorher gestapelten sowie um die vorbestimmte Strecke verschobenen Blättern jedesmal, wenn das Blatt auf der genannten Schale gestapelt wird, bewegen.

20. Blatt-Zuführvorrichtung nach Anspruch 18, in welcher die besagten Bewegungseinrichtungen das Blatt in der erwähnten vorbestimmten Richtung um eine erste vorbestimmte Strecke bewegen, bis eine nachlaufende Kante des genannten Blatts durch die besagten ersten Transporteinrichtungen durchläuft, und anschließend das genannte Blatt in einer umgekehrten Richtung um eine zweite vorbestimmte Strecke, die kürzer als die erwähnte erste vorbestimmte Strecke ist, zurückführen.

21. Blatt-Zuführvorrichtung nach Anspruch 18, in welcher die erwähnten zweiten Transporteinrichtungen den genannten Blattstapel in eine Position transportieren, in der das von den besagten ersten Transporteinrichtungen transportierte Blatt einem Blatt des genannten Blattstapels, das den besagten ersten Transporteinrichtungen am nächsten ist, unter Verschiebung mit der vorbestimmten Strecke zueinander überlagert werden kann.

Revendications

1. Appareil d'alimentation en feuilles comportant :
des moyens d'empilage de feuilles destinés à empiler des feuilles les unes à la suite des autres en les décalant d'une quantité prédéterminée dans une direction d'alimentation en feuilles les unes par rapport aux autres ;
des moyens d'alimentation destinés à faire avancer les feuilles une à une depuis une pile de feuilles obtenue par l'empilage des feuilles avec un décalage de la quantité prédéterminée les unes par rapport aux autres ;
des moyens de transport destinés à transporter ladite pile de feuilles formée par lesdits moyens d'empilage de feuilles dans des sens normal et inversé entre lesdits moyens d'empilage de feuilles et lesdits moyens d'alimentation ; et
des moyens de commande destinés à commander lesdits moyens de transport de manière que lesdits moyens de transport transportent ladite pile de feuilles jusqu'auxdits moyens d'empilage de feuilles lorsque les feuilles sont empilées et qu'ils transportent ladite pile de feuilles jusqu'auxdits moyens d'alimentation lorsque les feuilles sont avancées.

2. Appareil d'alimentation en feuilles selon la revendication 1, dans lequel lesdits moyens d'empilage de feuilles comprennent un bac sur lequel les feuilles sont empilées.

3. Appareil d'alimentation en feuilles selon la revendication 1, dans lequel lesdits moyens

d'empilage de feuilles comportent des éléments rotatifs de transport destinés à faire avancer les feuilles en même temps que les feuilles précédemment avancées à chaque fois que les feuilles sont avancées jusqu'à eux.

4. Appareil d'alimentation en feuilles selon la revendication 1, dans lequel lesdits moyens d'alimentation font avancer la feuille en la pinçant entre eux.

5. Appareil d'alimentation en feuilles selon la revendication 4, dans lequel lesdits moyens d'alimentation comprennent deux éléments rotatifs d'alimentation destinés à pincer la feuille entre eux.

6. Appareil d'alimentation en feuilles selon la revendication 1, dans lequel lesdits moyens de transport transportent la feuille en la pinçant entre eux.

7. Appareil d'alimentation en feuilles selon la revendication 6, dans lequel lesdits moyens d'alimentation comprennent deux seconds éléments rotatifs d'alimentation destinés à pincer la feuille entre eux.

8. Appareil d'alimentation en feuilles selon la revendication 6, dans lequel lesdits moyens de commande commandent lesdits moyens de transport de manière que, lorsque la feuille est avancée, lesdits moyens de transport transportent ladite pile de feuilles jusqu'auxdits moyens d'alimentation jusqu'à ce qu'une feuille se trouvant dans ladite pile, la plus proche desdits moyens d'alimentation, soit libérée d'un état pincé à l'aide desdits moyens de transport.

9. Appareil d'alimentation en feuilles selon la revendication 8, dans lequel, lorsque la feuille est avancée, lesdits moyens de transport pincent les feuilles autres qu'une feuille devant être avancée par lesdits moyens d'alimentation.

10. Appareil de formation d'images comportant :

des moyens de formation d'image destinés à former une image sur une feuille ;

des moyens d'empilage de feuilles destinés à empiler des feuilles successives sur lesquelles l'image est formée par lesdits moyens de formation d'image, avec un décalage d'une quantité prédéterminée dans une direction d'alimentation des feuilles, les unes par rapport aux autres ;

des moyens d'alimentation destinés à faire avancer les feuilles une à une depuis une pile de feuilles obtenue par empilage des feuilles avec un décalage de la quantité prédéterminée entre les feuilles ;

des moyens de transport destinés à transporter ladite pile de feuilles formée par lesdits moyens d'empilage de feuilles dans des sens normal et inversé entre lesdits moyens d'empilage de feuilles et lesdits moyens d'alimentation ; et

des moyens de commande destinés à commander lesdits moyens de transport de manière que lesdits moyens de transport ramènent ladite pile de feuilles desdits moyens d'alimentation auxdits moyens d'empilage de feuilles pour empiler les feuilles sur lesquelles l'image est formée par lesdits moyens de formation d'image après qu'elles ont été avancées par lesdits moyens d'alimentation, afin que l'on obtienne une nouvelle pile de feuilles.

11. Appareil de formation d'images selon la revendication 10, dans lequel lesdits moyens d'empilage de feuilles comportent des éléments rotatifs de transport destinés à faire avancer la feuille en même temps que les feuilles précédemment avancées à chaque fois que la feuille est avancée jusqu'à eux.

12. Appareil de formation d'images selon la revendication 10, dans lequel lesdits moyens d'alimentation font avancer la feuille tout en la pinçant entre eux.

13. Appareil de formation d'images selon la revendication 12, dans lequel lesdits moyens d'alimentation comprennent deux éléments rotatifs d'alimentation destinés à pincer la feuille entre eux.

14. Appareil de formation d'images selon la revendication 10, dans lequel lesdits moyens de transport transportent la feuille tout en la pinçant entre eux.

15. Appareil de formation d'images selon la revendication 14, dans lequel lesdits moyens de commande commandent lesdits moyens de transport de manière que lesdits moyens de transport transportent ladite pile de feuilles jusqu'auxdits moyens d'alimentation jusqu'à ce qu'une feuille se trouvant dans ladite pile, la plus proche desdits moyens d'alimentation, soit libérée d'un état pincé à l'aide desdits moyens de transport, pour faire avancer les feuilles à l'aide desdits moyens d'alimentation.

16. Appareil de formation d'images selon la revendication 15, dans lequel, lorsque la feuille est avancée, lesdits moyens de transport pincent les feuilles autres qu'une feuille devant être avancée par lesdits moyens d'alimentation.

17. Appareil de formation d'images selon la revendication 15, dans lequel lesdits moyens de transport et lesdits moyens d'empilage de feuilles maintiennent des éléments rotatifs de transport pouvant tourner tout en pinçant la feuille entre eux en commun.

18. Appareil d'alimentation en feuilles comportant :

un premier moyen de transport destiné à transporter une feuille dans une direction prédéterminée ;

un bac destiné à empiler les feuilles avancées par ledit premier moyen de transport ;

des moyens de déplacement destinés à déplacer les feuilles empilées sur ledit bac, afin que la feuille avancée par ledit premier moyen de transport recouvre une feuille précédemment empilée sur ledit bac avec un décalage d'une distance prédéterminée dans ladite direction prédéterminée par rapport à ladite feuille précédemment empilée ;

des moyens d'alimentation destinés à faire avancer les feuilles une à une depuis une pile de feuilles obtenue par empilage des feuilles avec un décalage de la distance prédéterminée, entre elles ; et

un second moyen de transport destiné à transporter ladite pile de feuilles obtenue par empilage des feuilles avec un décalage de la distance prédéterminée, entre elles, vers lesdits moyens d'alimentation, et à transporter ladite pile de feuilles depuis lesdits moyens d'alimentation jusqu'audit bac.

19. Appareil d'alimentation en feuilles selon la revendication 18, dans lequel lesdits moyens de déplacement déplacent une feuille en même temps que des feuilles précédemment empilées et déplacées de la distance prédéterminée, à chaque fois que la feuille est empilée sur ledit bac.

20. Appareil d'alimentation en feuilles selon la revendication 18, dans lequel lesdits moyens de déplacement déplacent la feuille dans ladite direction prédéterminée sur une première distance prédéterminée jusqu'à ce qu'un bord arrière de ladite feuille franchisse ledit premier moyen de transport, et, ensuite, ramène ladite feuille dans un sens inversé sur une seconde distance prédéterminée plus courte que ladite première distance prédéterminée.

21. Appareil d'alimentation en feuilles selon la revendication 18, dans lequel ledit second moyen de transport transporte ladite pile de feuilles dans une position où la feuille transportée par ledit premier moyen de transport peut être superposée à une feuille de ladite pile de feuilles la plus proche dudit premier moyen de transport avec un décalage de la distance prédéterminée, entre elles.

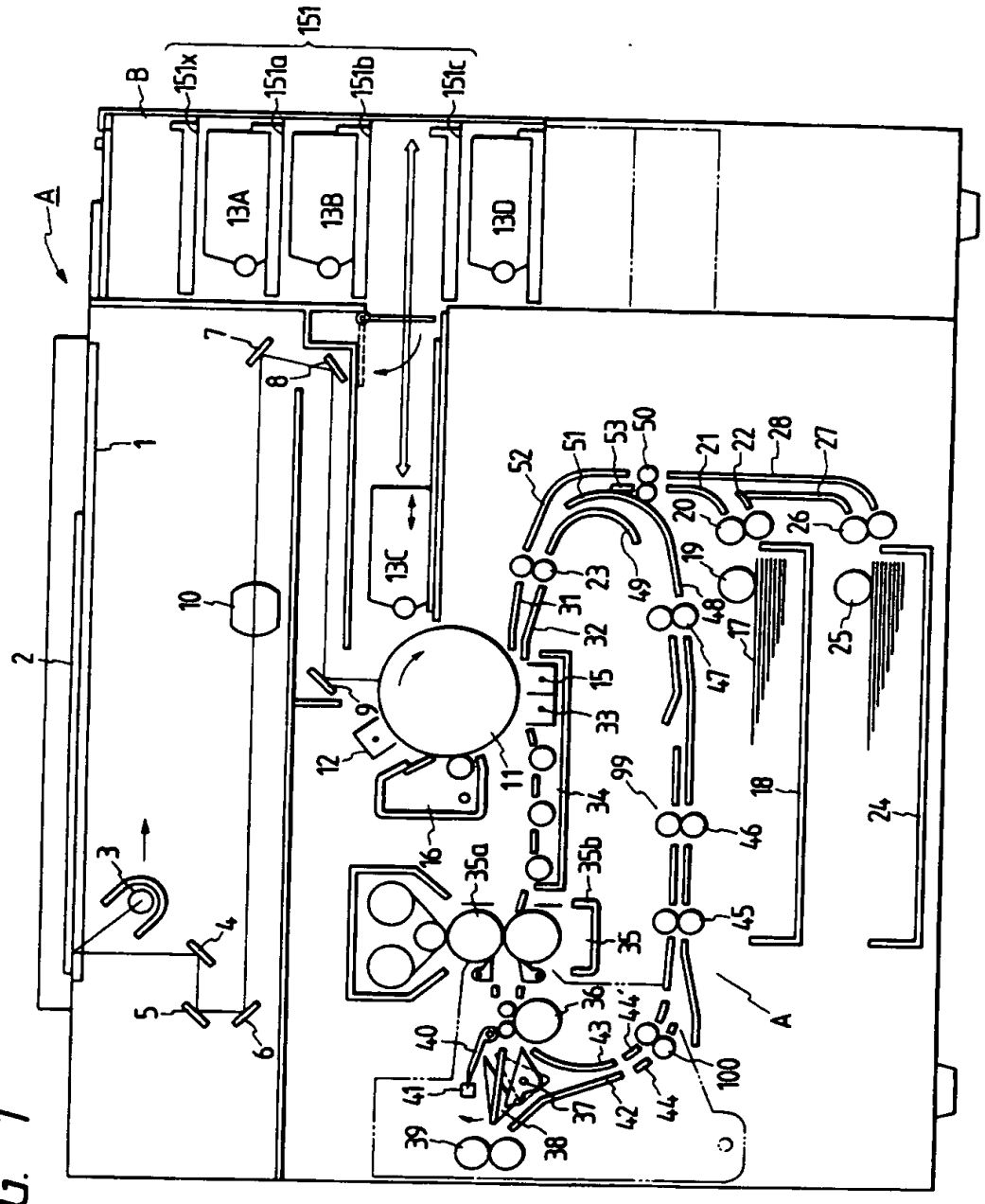
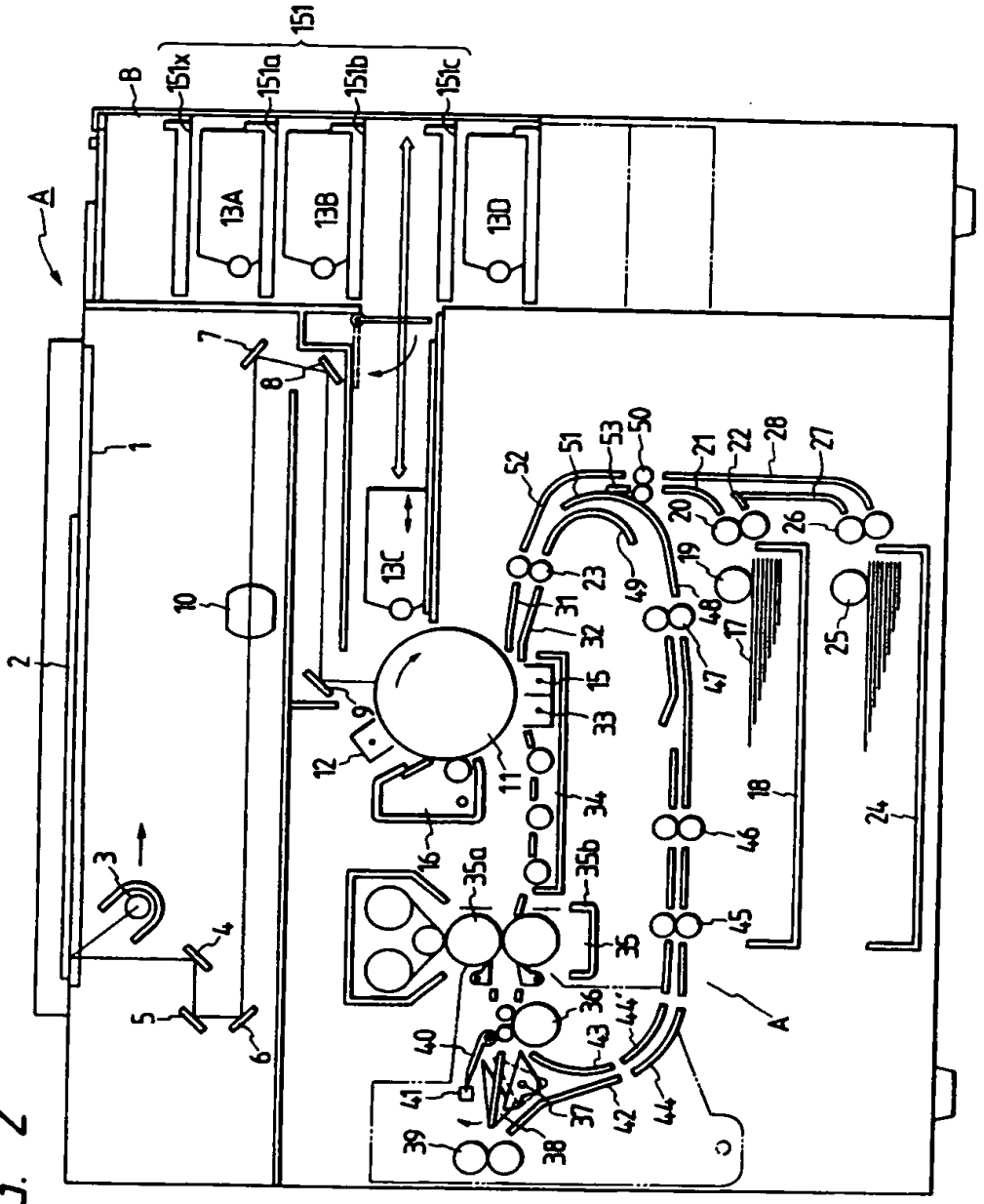

151
151x
151a
151b
151c
B
A
13A
13B
13C
13D
1
2
3
4
5
6
7
8
9
10
11
12
15
16
17
18
19
20
21
22
23
24
25
26
27
28
31
32
33
34
35
35a
35b
36
37
38
39
40
41
42
43
44
44'
45
46
47
48
49
50
51
52
53
99
100

FIG. 1

FIG. 2


151
151x
151a
151b
151c
B
A
13A
13B
13C
13D
1
2
3
4
5
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7
8
9
10
11
12
15
16
17
18
19
20
21
22
23
24
25
26
27
28
31
32
33
34
35a
35b
35
36
37
38
39
40
41
42
43
44
44'
45
46
47
48
49
50
51
52
53

FIG. 3

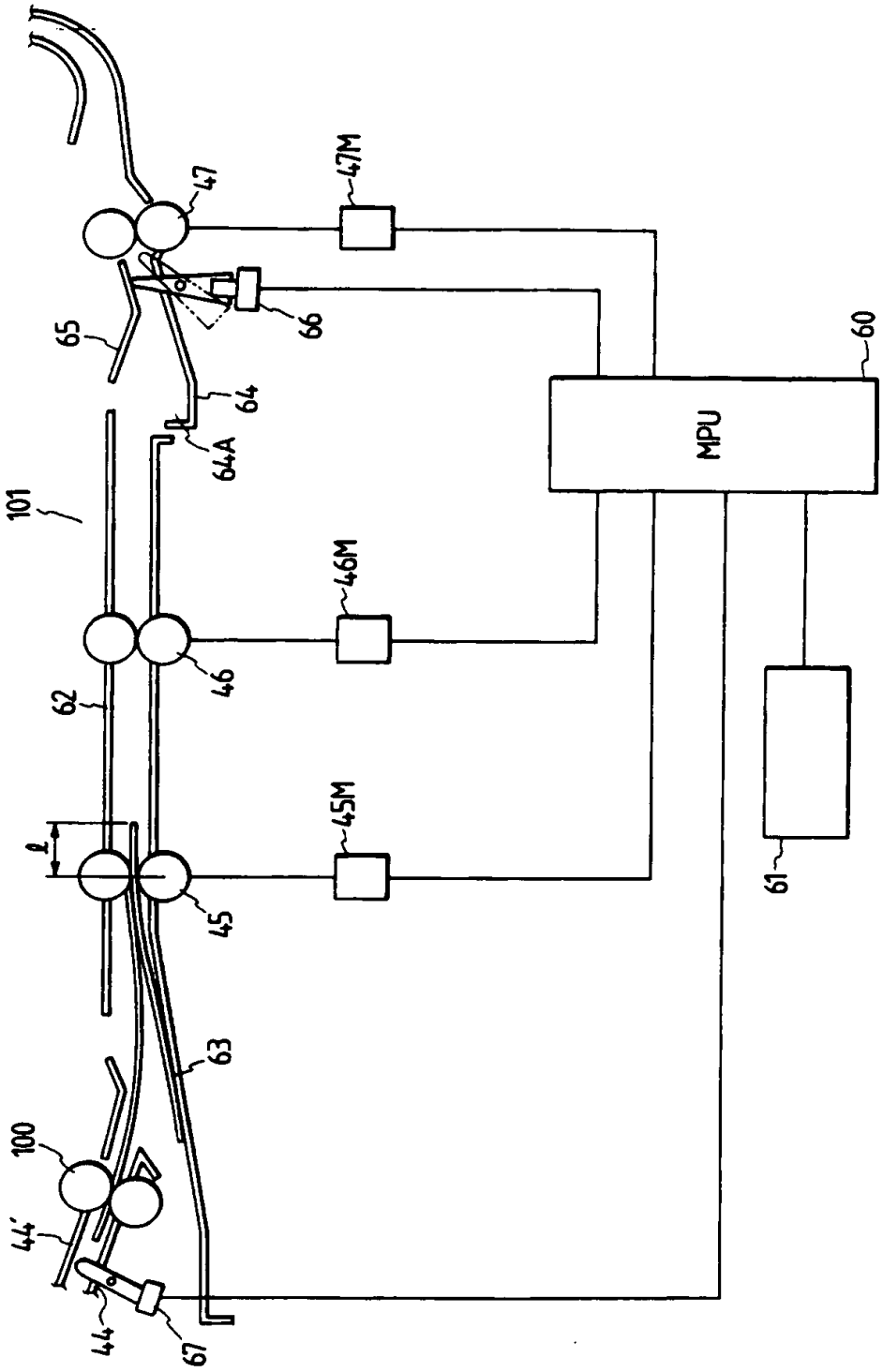


FIG. 4

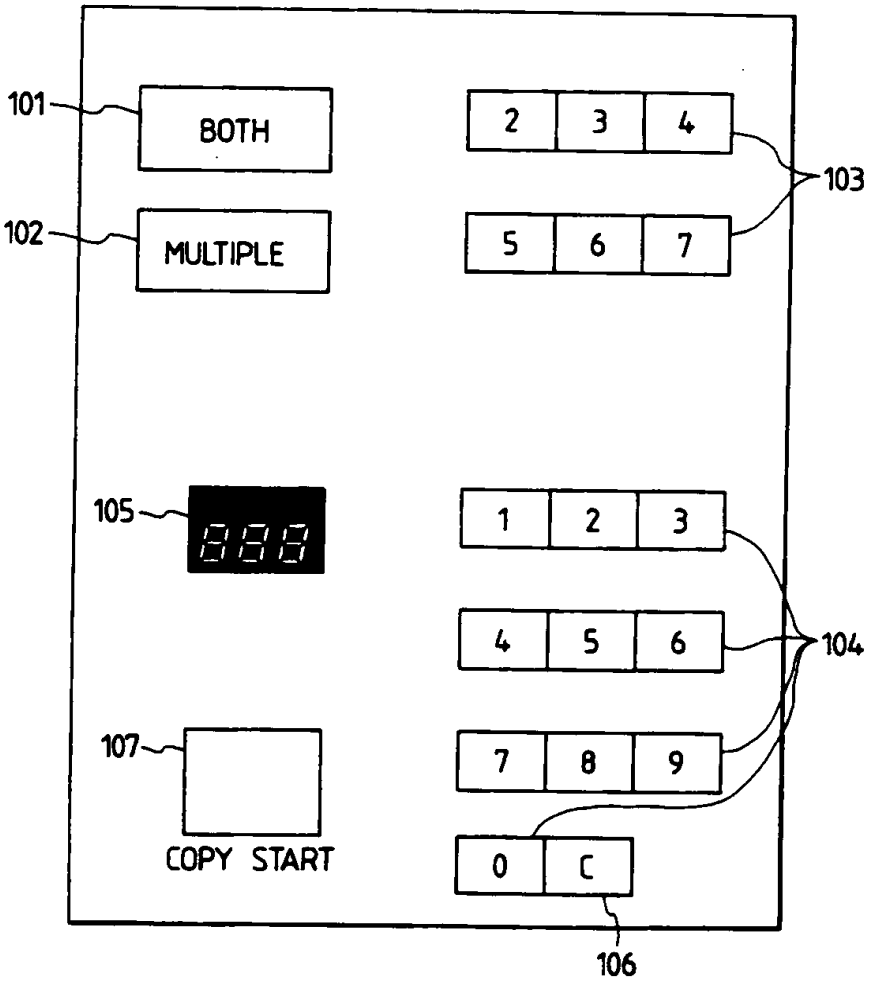

101
BOTH
102
MULTIPLE
2
3
4
5
6
7
103
105
1
2
3
4
5
6
104
7
8
9
0
C
106
107
COPY START

FIG. 5

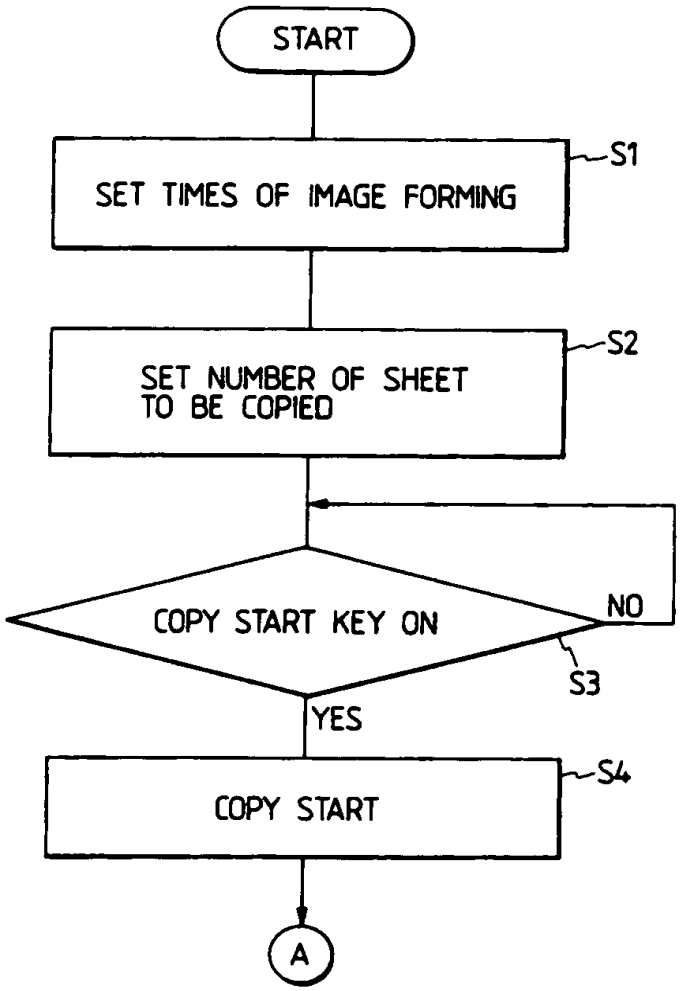

START
SET TIMES OF IMAGE FORMING
S1
SET NUMBER OF SHEET TO BE COPIED
S2
COPY START KEY ON
NO
S3
YES
COPY START
S4
A

FIG. 6

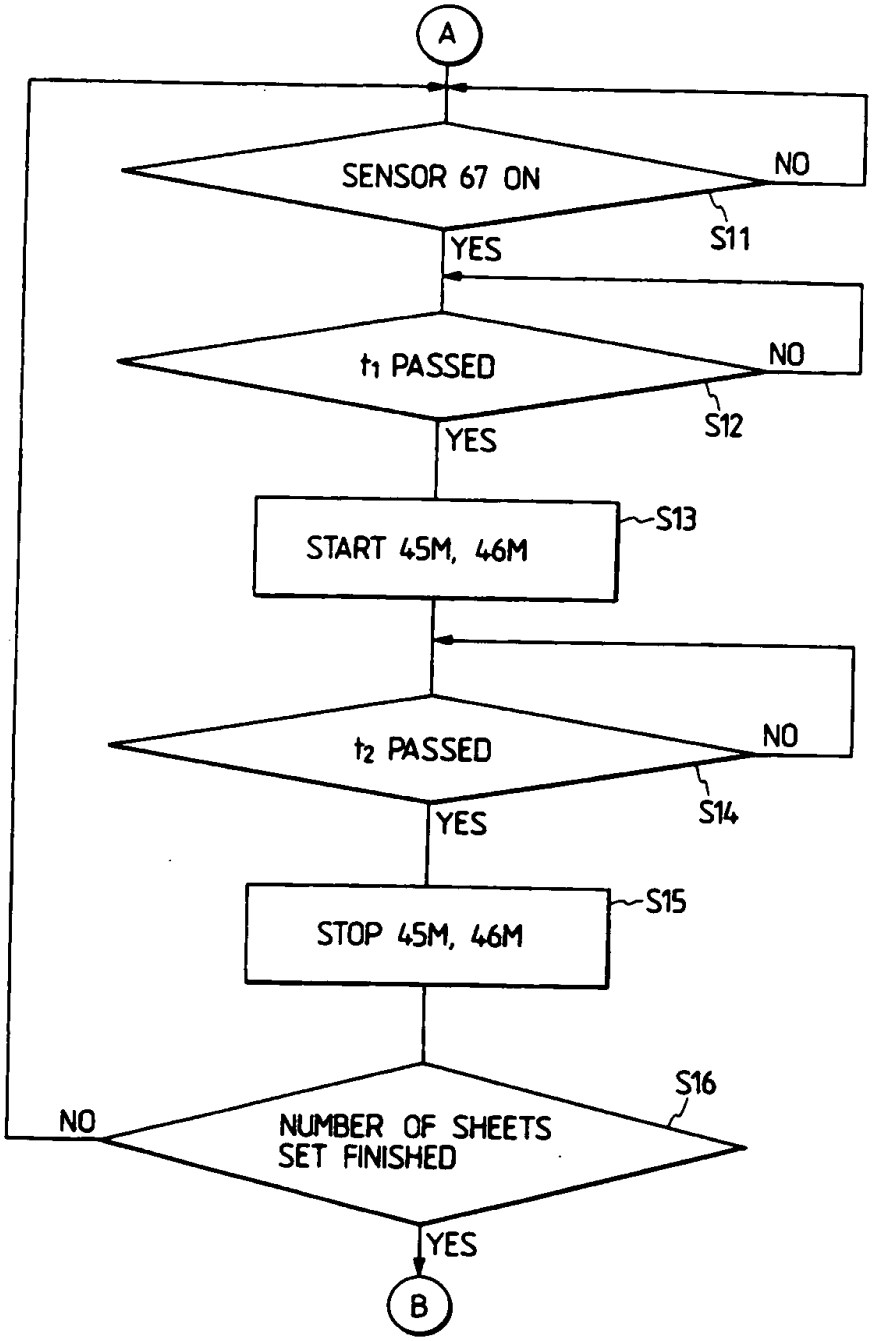

A
SENSOR 67 ON
NO
S11
YES
t1 PASSED
NO
S12
YES
START 45M, 46M
S13
t2 PASSED
NO
S14
YES
STOP 45M, 46M
S15
S16
NO
NUMBER OF SHEETS SET FINISHED
YES
B

FIG. 7

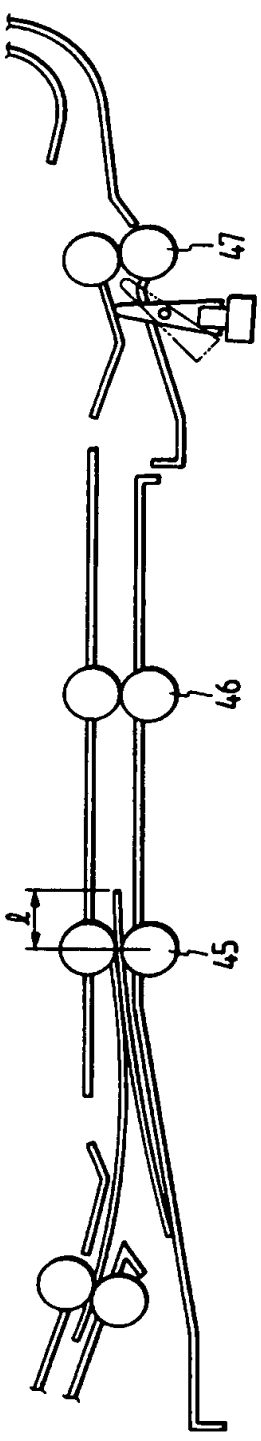


FIG. 8

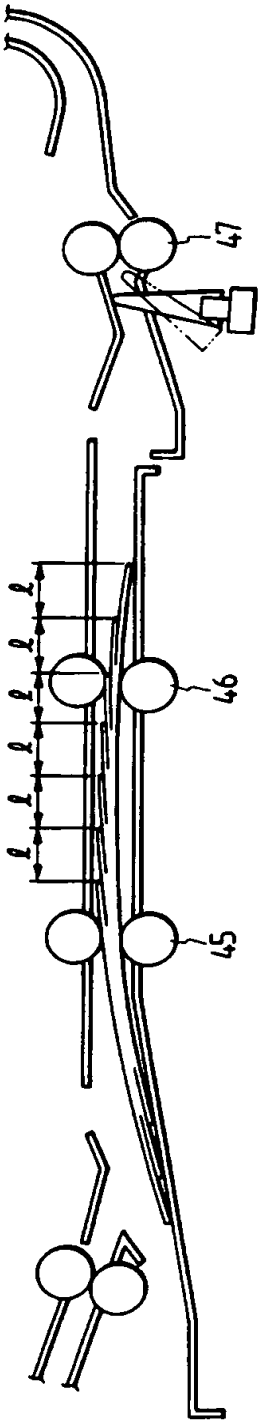


FIG. 9

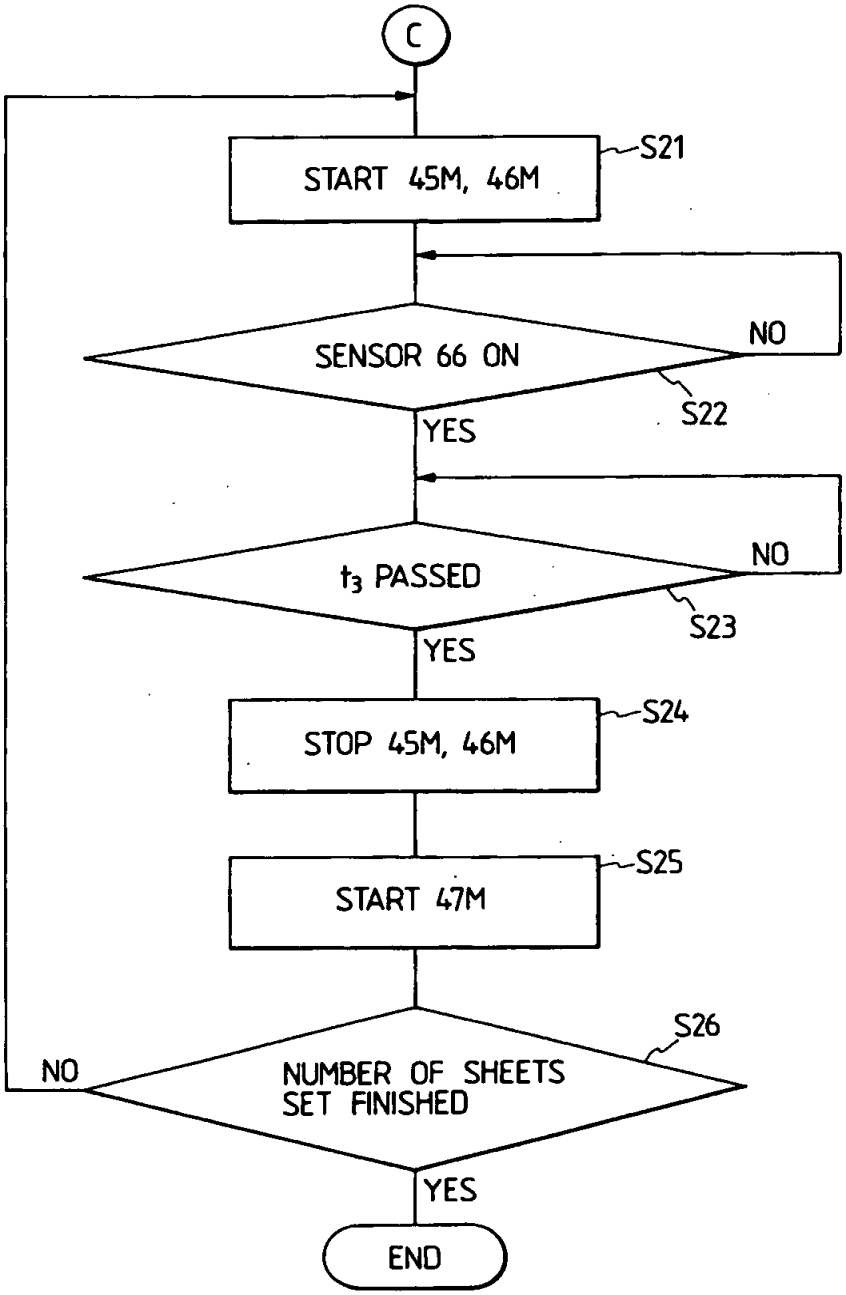

C
START 45M, 46M
S21
SENSOR 66 ON
NO
S22
YES
t_3 PASSED
NO
S23
YES
STOP 45M, 46M
S24
START 47M
S25
NUMBER OF SHEETS SET FINISHED
S26
NO
YES
END

FIG. 10

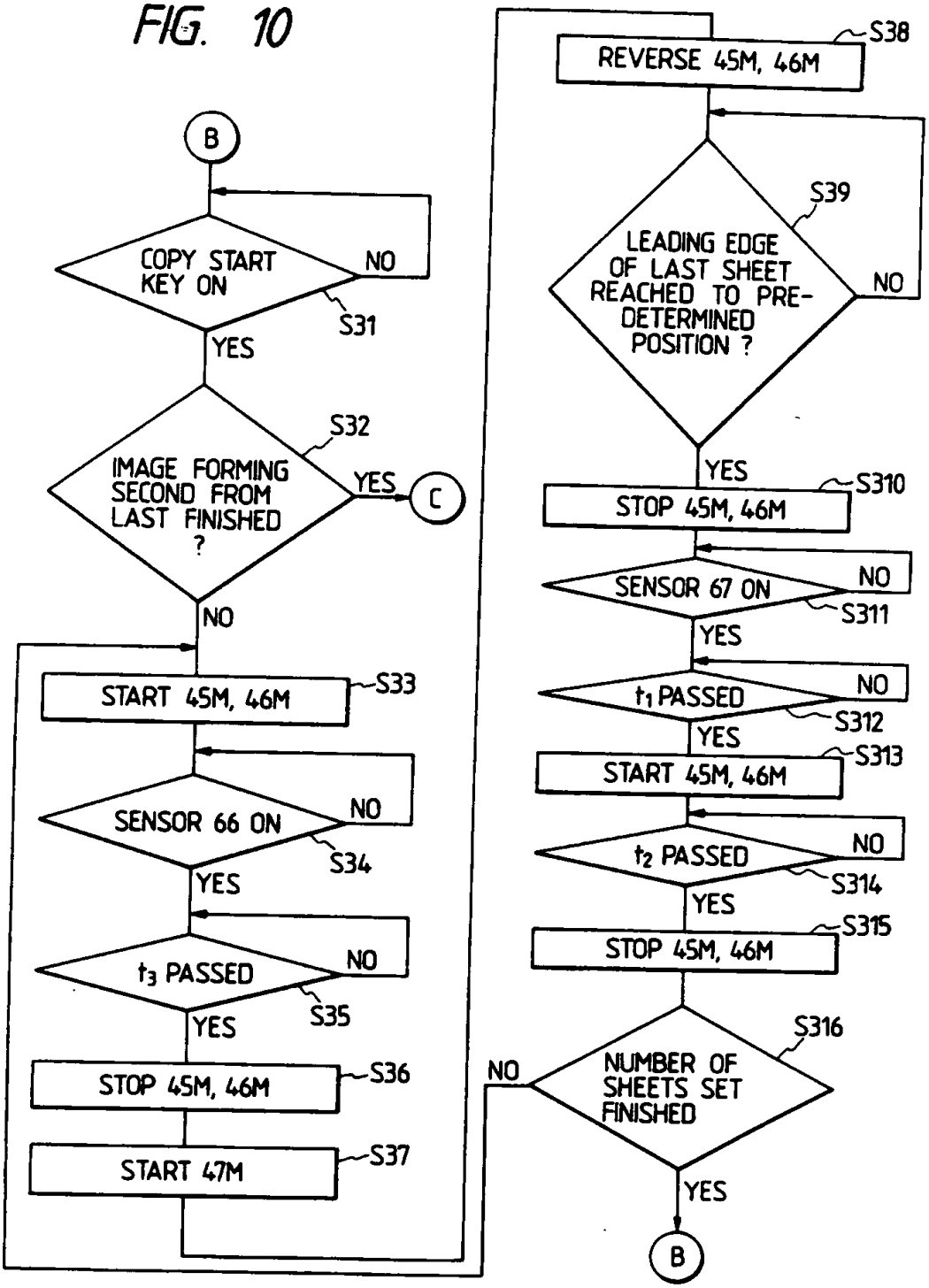

B
COPY START KEY ON
NO
S31
YES
S32
IMAGE FORMING SECOND FROM LAST FINISHED ?
YES
C
NO
START 45M, 46M
S33
SENSOR 66 ON
NO
S34
YES
t3 PASSED
NO
S35
YES
STOP 45M, 46M
S36
START 47M
S37
REVERSE 45M, 46M
S38
S39
LEADING EDGE OF LAST SHEET REACHED TO PRE-DETERMINED POSITION ?
NO
YES
STOP 45M, 46M
S310
SENSOR 67 ON
NO
S311
YES
t1 PASSED
NO
S312
YES
START 45M, 46M
S313
t2 PASSED
NO
S314
YES
STOP 45M, 46M
S315
S316
NUMBER OF SHEETS SET FINISHED
NO
YES
B

FIG. 11

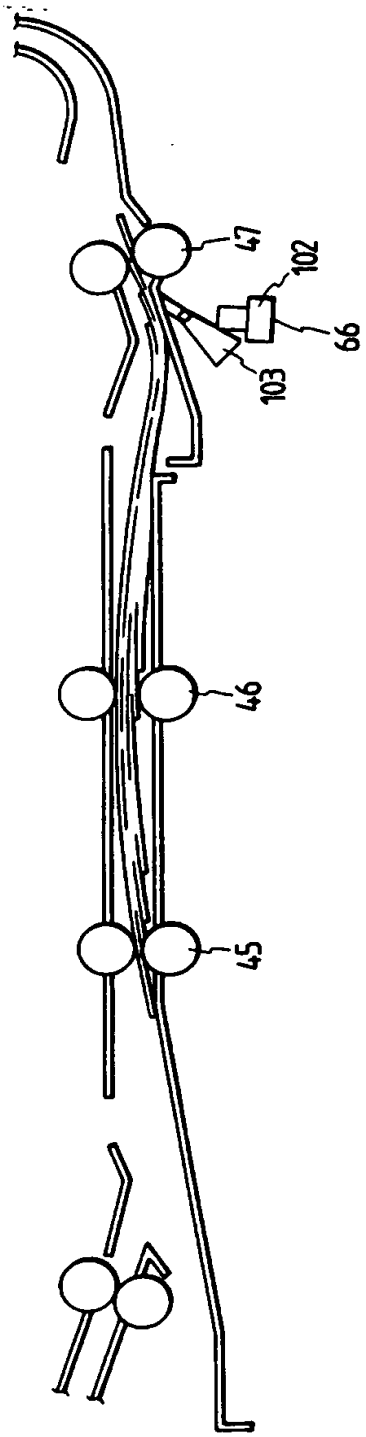


FIG. 12

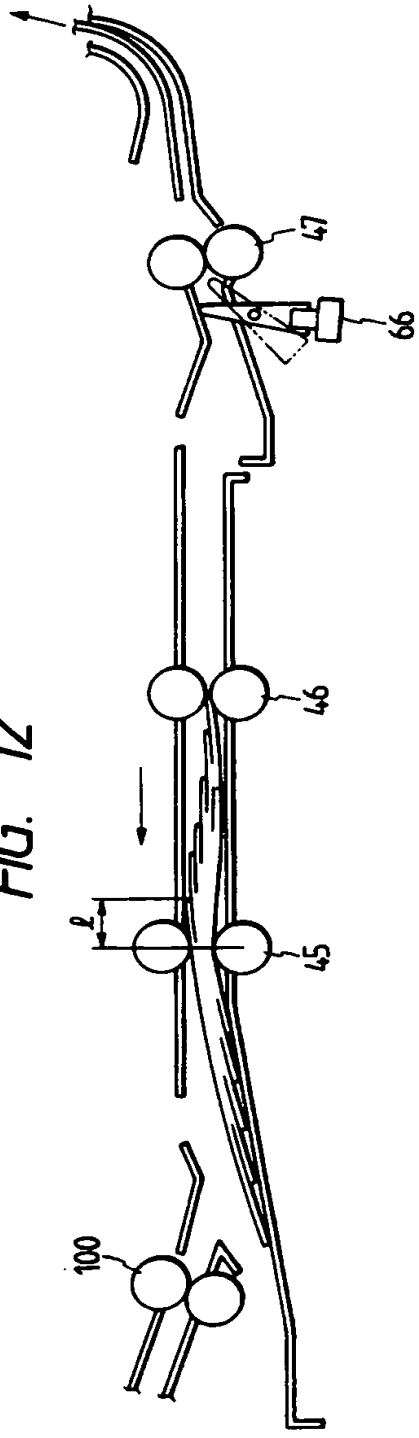


FIG. 13

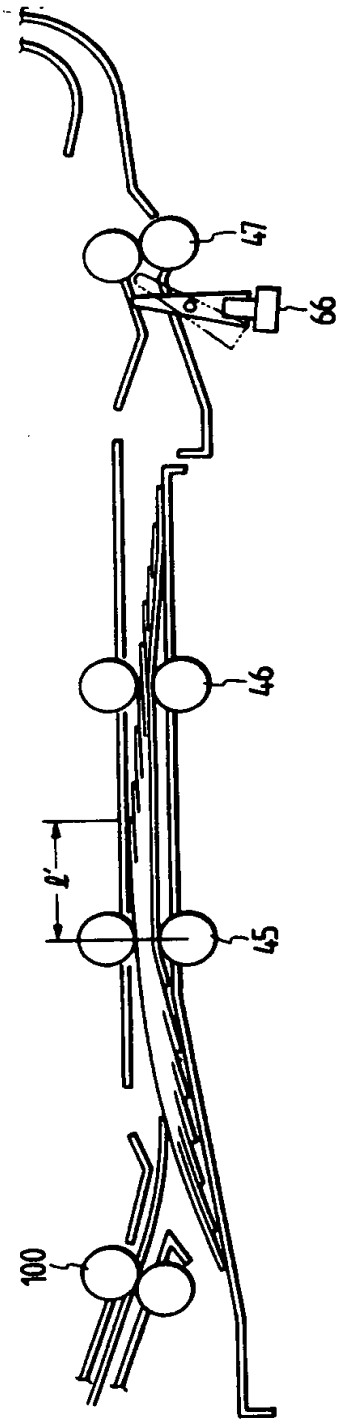
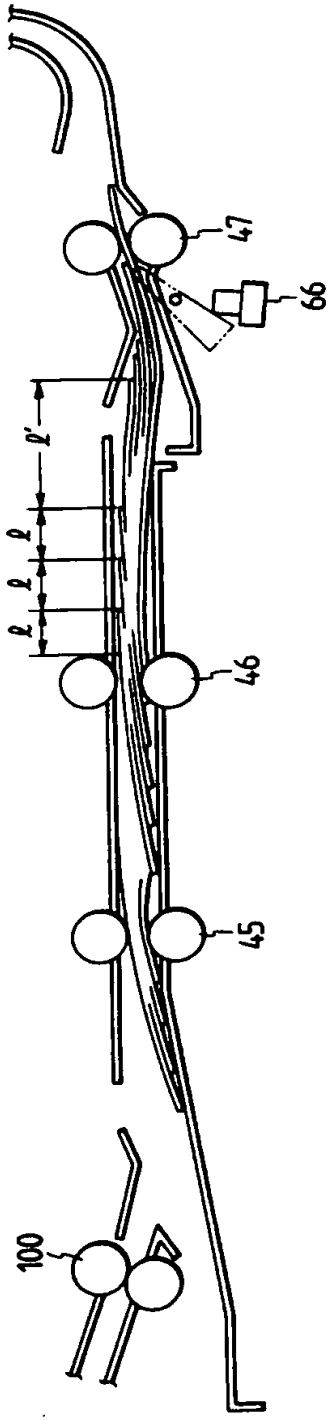


FIG. 14



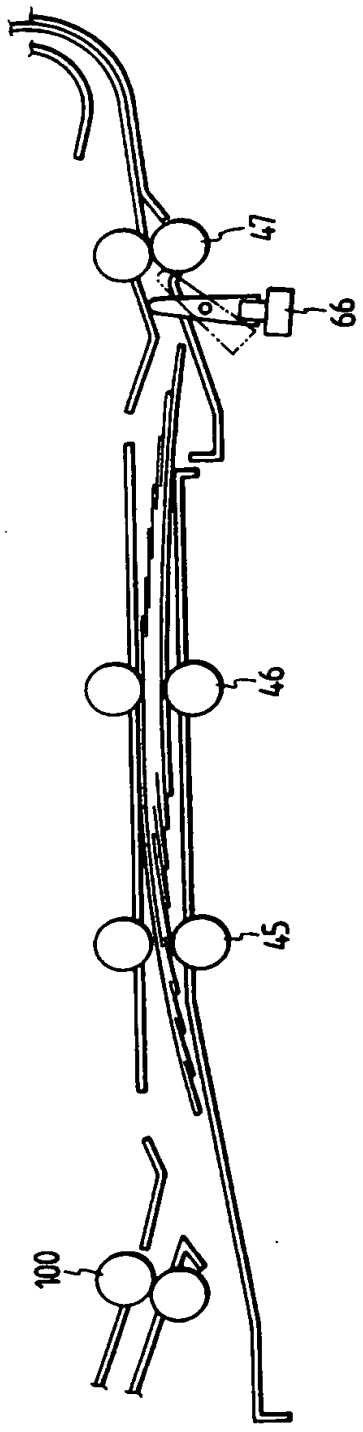


FIG. 15